

### REMARKS

Reconsideration of the application and the claims is respectfully requested.

Claims 1-11, 13-28, 30-34, 36-46, and 48-58 remain pending. Claims 1, 18, 36 and 56 are independent.

At the outset, applicant addresses the Examiner's Response to Arguments on pages 20-21 of the Office Action. Specifically, the Examiner contends that "without copying" is not found in the specification. In response, applicant respectfully directs the Examiner to page 11, lines 11-26, page 14, lines 18-23 of the originally submitted specification. Those sections disclose that in a virtual copy, no physical data is copied from one volume to another. Rather, the bits of the bitmap are set or reset to indicate which volume (first or second) has the data to be copied to the third volume. Thus, contrary to the Examiner's assertions, the specification discloses that virtual copy does not copy the actual data.

Applicant further notes that claim 57 is not rejected or otherwise addressed in the Office Action. Applicant has noted this point in applicant's previous response. However, in the instant final Office Action, the Examiner again overlooks that claim. Thus, it is not clear whether that claim is allowable, or if rejected what the basis of the rejection is. Applicant thus requests the Examiner to clarify the status of that claim.

#### Claim Rejections – 35 U.S.C. §103

The Office Action rejected claims 1-11, 13-16, 18-28, 30-33, 36-46 and 48-51, 53-56 and 58 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,643,671 to Milillo et al ("Milillo"), in view of U.S. Patent No. 6,253,295 to Beal et al. ("Beal"). Claims 17, 34 and 52 were rejected under 35 U.S.C. §103(a) as being unpatentable over Milillo in view of Beal and further in view of U.S. Patent No. 5,504,861 to Crockett et al. ("Crockett"). Claim 57 is not rejected over any references.

As understood by applicants, Milillo discloses copying of modified data to a primary target volume. On the other hand, “a first point in time virtual copy” claimed in independent claims of the present application performs a virtual copy by setting or updating the first bitmap. The data that is modified is not actually copied to the second volume. Rather, a bitmap is set to indicate that data is modified on the first volume. The Examiner in Response to Arguments on pages 20-21 of the Office Action responds that Milillo’s copy of the bitmap having the accumulated write commands reads on the claimed virtual copy that updates the bitmap without copying the physical data from the volumes. Applicant disagrees. While Milillo discloses a copy of bitmap having the accumulated write commands received by the primary target volume from source volume, Milillo specifically discloses that its primary target volume also receives from source volume the data of the write commands from host (Milillo, column 8, lines 52-53). Thus, Milillo does not disclose the claimed “virtual copy”, in which no physical data from the source volume is actually copied.

With respect to Beal, while Beal discloses enabling pair-pair remote copy, Beal does not disclose or suggest those elements that Milillo lacks. For at least this reason, applicant believes the cited references do not disclose or suggest every element claimed in independent claims and their respective dependent claims by virtue of dependencies, and therefore those claims are unobvious over the cited references.

In addition, the references also do not disclose or suggest at least, “synchronizing the second volume with the third volume for the current database update by transmitting the modified data from either the first volume or the second volume depending on bit setting in the first bitmap, to the third volume as indicated by the one or more bits in the second bitmap” claimed in independent claim 1 and similarly claimed in independent claim 18, 36 and 56. That is, the references do not disclose or suggest to transmit the modified data from either the first volume or the second volume depending on a bit setting in the first bitmap. The Examiner cites Milillo’s column 2, lines 43-67 and column 4, lines 47-60. While those passages of Milillo describe that data indicated by write commands (which

are stored in the primary target volume) are migrated to the secondary volume, those passages do not disclose or suggest that depending on the bit setting in the first bitmap to determine from which volume to get the modified data.

For at least those additional reasons, independent claims 1, 18, 36 and 56, and their respective dependent claims are believed to be unobvious over the cited references.

With respect to the rejection of claims 17, 34 and 52 under 35 U.S.C. §103(a) over Milillo in view of Beal and further in view of Crockett, because Crockett does not disclose or suggest what Milillo and Beal fail to disclose or suggest as discussed above, those claims are also not obvious for at least the same foregoing reasons.

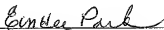
While dependent claim 57 is unobvious over the cited references for the same foregoing reasons by virtue of its dependency, that claim is further unobvious because none of the cited references disclose or suggest, "performing a first point in time virtual copy of the modified data of the first volume to a second volume at the primary site by updating the first bitmap and transferring the first bitmap to a second bitmap at the primary site for indicating the modified data that is to be transmitted to a third volume, which is at the remote site, for the current database update; and the step of synchronizing includes synchronizing the second volume with the third volume for the current database update by determining from the first bit map whether the modified data of the second volume to be transmitted is located in the first volume or the second volume and transmitting the modified data of the second volume to the third volume as indicated by the one or more bits in the second bitmap." As discussed above, the Office Action does not reject this claim. Applicant also believes that there is no reason to reject that claim as the cited references do not read on the elements of that claim.

Applicant believes that the above reasons suffice to overcome all rejections. However, in order to further advance the prosecution of the present application, claim 1 is being amended. The amendment does not mean that claim 1 as previously presented is not patentable, as applicant has

provided reasons above for overcoming the prior art rejections. Claim 1 as amended now recites that transferring the first bitmap to a second bitmap includes at least inverting bits of the first bitmap to the second bitmap. Support for the amendment can be found at least on page 12, lines 2-4 of the originally submitted specification. The cited references do not disclose or suggest to invert the bits. For example, while Milillo shows a bit map and a copy with accumulated write commands, Milillo does not disclose or suggest that bits in the first bit map are inverted into second bit map. The rest of the cited references also do not disclose or suggest what Milillo lacks. Therefore, for this additional reason, claim 1 is believed to be unobvious over the cited references.

This communication is believed to be fully responsive to the Office Action and every effort has been made to place the application in condition for allowance. A favorable Office Action is hereby earnestly solicited. If the Examiner believes a telephone conference might expedite prosecution of this case, it is respectfully requested that the Examiner call applicant's attorney at (516) 742-4343.

Respectfully submitted,

  
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